A DRAWING-BOARD WITH REVOLVING DISK FOR STEREOGRAPHIC PROJECTION

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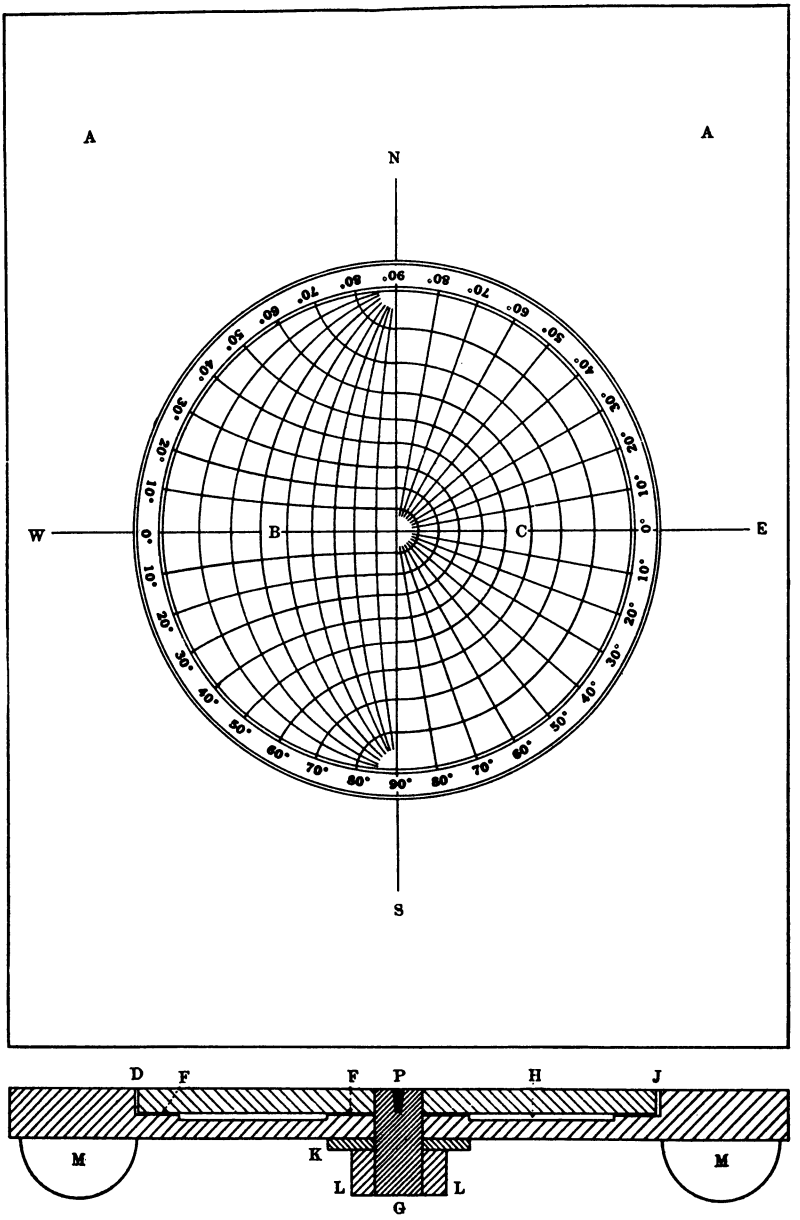
Professor Wülfing recently showed the writer a wall chart for stereographic projection which he has since described.[1] It consists of a ground glass plate back of which is pivoted a 70 cm. Wulff net which is made of pasteboard and projects beyond the glass cover so that it may be turned to any desired position. The advantages of using the Wülfing chart were so apparent that the writer has constructed a drawing-board, for the individual use of students, on a somewhat similar plan but combining with the Wulff net a half-net with the north pole at the center. The construction is simple and the board inexpensive.

In making stereographic projections by ordinary methods, one must either work out his own dimensions, use a Penfield protractor, or a net like that of Fedorow or of Wulff. Transparent nets are an improvement over Penfield's method, although one must always carefully center the net for each measurement. With the drawing-board here described, the net is revolved instead of the paper and no centering is necessary.

The board was constructed from an ordinary drawing-board, $33\frac{1}{2} \times 43\frac{1}{2}$ cm. in size. It was placed on a lathe and a recess, 22 cm. in diameter (D-J in the illustration), was turned out halfway through the board which was 2 cm. thick. A further slight cut (H) was made to reduce friction when the disk is rotated, leaving only the bearing shown at F-F. A 2 cm. hole was turned entirely through the board (P-G). To keep the dial disk (B-C) perfectly flat, it was made from a piece of three-ply, built-up pyrography board, such as is sold in all art stores. This disk, also, was accu-

[1] E. A. Wülfing, "Wandtafeln für stereographische Projektion," *Centralbl. f. Min., Geol., u. Pal.* (1911), 273–75.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rately turned on the lathe and has a diameter of 21.8 cm., which leaves, when inserted in the recess prepared for it, a very slight margin for expansion. In the exact center a 2 cm. hole was turned and into this the plug P-G was glued. P is a copper rivet set in the top of the plug to serve as a compass center. K is a metal washer and L-L a wooden knob held on the plug G only by friction. This permits its removal in case the dial should ever bind and need trimming down. M-M are knobs, one of which is glued to each corner of the board. They serve as feet to keep the button L from touching when the board is placed on a flat surface. The plug P-G fits snugly into the drawing-board and the dial will readily remain in any position to which it is turned.

The net B-C in the accompanying figure is shown divided only into parts of 10 degrees each. Actually the section B was made by gluing half a Wulff[1] net to the top of the dial disk. The mathematical center is located by a very small pit in the top of the plug P. A further guide to centering the net is a scratch circle described upon the wooden disk and having a diameter of 2 mm. more than the Wulff net. The section C of the dial is used to measure distances on horizontal small circles and vertical great circles. It was made on a sheet of cardboard by drawing circles from the stereographically projected lines of the Wulff net. These also, as well as the projected great circles which appear as radii, are drawn 2 degrees apart although they are shown 10 degrees apart in the figure. Upon the drawing-board itself the N-S and E-W lines were drawn parallel to the sides of the board.

Cutting the net in half occasionally makes it necessary to complete a vertical small circle in two lines. The curves of the right-hand net (C) might have been drawn, say in red, over a complete Wulff net, but the confusion resulting would probably cause more inconvenience than the present necessity of occasionally drawing a vertical small circle in two operations. In most cases where such circles are used, the degree divisions on the equator are a sufficient substitute for the half-net cut off. Perhaps if the lines of every fifth vertical small circle were extended over the upper half of the right-hand net, it would be a convenience.

[1] *Zeitschr. f. Kryst.*, XXXVI (1902), 14–18.

The process of drawing is extremely simple. A sheet of tracing paper is fastened to the board (A-A) by means of thumb tacks and all angles and distances are measured directly by rotating the net into the desired positions. Since in stereographic projections all circles and angles appear in true proportions, such a drawing-board should find extensive use for map drawing as well as for crystal projection.